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Case 2

Seed Treater

Field of the Invention

The invention resides in the general field of chemically treating seeds or grains as in a grain elevator. Heretofore, the seeds were treated in an upper floor of the elevator, utilizing stationary facilities for treating and mixing the various seeds. In such an arrangement, the various seeds, i.e. different kinds, e.g. wheat, oats, corn, etc., were contained in bins in the elevator and various devices were utilized for transporting the seeds to a common outlet, and in doing so, they were mixed in various selected proportions, and liquid chemicals were applied to the seeds. Such an arrangement was cumbersome, slow, and required much labor to produce the desired results. In a following step, a truck was driven into the elevator, below the place of mixing, and after the mixing and other treatment steps were performed, the resulting seed mixture was fed into the truck.

Summary of the Present Invention

The seed treater of the present invention is a self-contained unit, that is secured to the structure of the elevator such as being bolted on the ceiling at the first floor, and the truck is driven under the device. The seeds are introduced into the treater from above, on the second floor of the elevator, and are mixed and coated in the treater, as they are passing therethrough.

The treater of the present invention is capable of on-demand receiving seeds of various kinds for blending from bins on the second floor where they were previously stored.

The treater is capable of being fed by instrumentalities on the second floor, such as by conveyor, belt, screws, chutes from hopper bins.

The device of the present invention will function as an on-demand apparatus in filling orders, both as to chemicals and seed blending, in that upon initiating an order for treated seed, the ingredients, mainly the different kinds of seeds for mixing, and chemicals, are introduced into the device independently, and they are thoroughly mixed while passing through the device, flowing into the truck uninterruptedly, i.e. upon selecting the ingredients to be put in the seed combination, the device is made to operate, and continues until the order is completed.

Other features and advantages are that the device is relatively small in size, it is relatively inexpensive to manufacture, and it is convenient to mount in position for ingredients to be mixed and delivered to the truck.

Another great advantage is, although relatively small and of inexpensive construction, the device will treat great amounts of seeds at an extremely rapid rate.

Another important feature is that the device, because of its compact and light weight construction, can be easily mounted in operable position.

Brief Descriptions of the Figures of the Drawings

Fig. 1 is a perspective overall view of the background in which the treater is utilized, and including the seed treater itself.

Fig. 2 is a diagrammatic view of the grain feeding instrumentalities on the second floor of the elevator leading to the seed treater.

Fig. 3 is a perspective view of the top flange on the seed treater, and the adjacent part of the interior.

Fig. 4 is a sectional view taken approximately at line 4-4 of Fig. 3, showing the upper end of the device.

Fig. 5 is a vertical axial sectional view of the whole seed treater.

Fig. 6 is an exterior view of the seed treater with an access door in open position.

Fig. 7 is a perspective view of the upper bearing support.

Fig. 8 is a view taken at line 8-8 of Fig. 7.

Fig. 9 is a side view of the applicator from inside the surrounding wall.

Fig. 10 is a top view of the applicator taken at line 10-10 at the lower end of Fig. 9.

Fig. 11 is a top view taken at line 11-11 at the lower end of Fig. 5.

Fig. 12 is a sectional view taken at line 12-12 at the lower end of Fig. 11.

Fig. 13 is an exterior view of the treater, showing the drive motor and its mounting platform, and including a portion of the structure of the elevator, and a truck.

Fig. 14 is a view, similar to Fig. 5, showing wipers for wiping the bowls.

Detailed Description

Attention is directed to Fig. 1 showing the seed treater identified 30, mounted in position in a grain elevator. The elevator has a second floor, indicted generally at 32, and other structural elements are shown. A floor structure itself 34, is indicated, in which the seed treater is directly mounted. The

seed treater is mounted at its top and it suspends from the floor structure, in position for a vehicle such as a truck 36, to drive into the elevator on the main floor, under the seed treater, to receive the grain from the latter. It is to be noted that the device is mounted only at one point, its top, as will be brought out in detail hereinbelow.

Fig. 1 shows instrumentalities for conveying seed to the device. These may include a conveyor 38, having a terminal chamber 40, with an outlet leading into the seed treater. Further attention is given to this feature, as represented diagrammatically in Fig. 2, which shows a conveyor 38, with other instrumentalities 42, leading thereinto, such as belts, chutes, screws, etc. The particular instrumentalities utilized for carrying seed to the device may be any of various kinds. The seed treater 30, is cylindrical in shape with central axis 44, (Figs. 1,5) disposed vertically. It includes a stationary drum 44) forming a surrounding wall 46, which has an access door 47. In the description herein, the seed treater is referred to as oriented in that position, i.e., vertically.

Fig. 5 includes most of the interior items, and Fig. 14, which is similar to Fig. 5, additionally shows wipers for wiping the bowls, as described below.

The device has a flat, annular top closure plate 48, with a central inlet opening or feed hole 50, surrounded by a

cylindrical tube 52, and has a conical bottom closure plate 54, with a central discharge opening 56, forming a bottom bowl.

Fig. 4 shows the means for mounting the device on the ceiling, or the second floor. In this figure the second floor structure 34 is shown, and a hanger means 58 is provided for mounting the device directly on the floor structure. In the hanger means 58 is an opening 60 receiving grain from the outlet end of the conveyor 38 (Fig. 2) and directing it into the opening 50, in the device.

Attention is directed to Fig. 5, which is an axial sectional view of the entire device. In this view the cylindrical wall 46 is shown, having a surrounding outwardly directed transverse flange 60, at the top, and a similar transverse flange 62, at the bottom.

The top closure plate 48 shown in Fig. 4 is also shown in Fig. 5, this plate having a radially extended peripheral flat flange 64, detachably secured to the flange 60, and welded to the tube 52 around the feed hole 50.

The bottom closure plate 54 has a peripheral transverse flange 65, secured to the flange 62, for mounting the plate onto the cylindrical wall 46.

The seed treater includes a main shaft 68, extending nearly the height of the drum 44, being driven by a drive means at the bottom, referred to below. The shaft is mounted in an upper

bearing 70 and a lower bearing 72, the upper bearing 70 being mounted on an upper bearing support 74, and the lower bearing on and under a lower bearing support 76.

The upper bearing member 70 is shown in Figs. 7 and 8 and is fixedly mounted in the device. It includes a pair of spaced parallel arms 78, with curved end plates 80, the latter being detachably secured to the inner surface of the wall 46, and having a central plate 82, on which the bearing 70 is directly mounted.

Mounted in the support 74, are tubes 84, arranged oppositely and on a common diameter for conveying liquid chemicals into the device. These tubes lead through the drum and under the bearing plate 82 and empty downwardly into the drum. The outer ends of the tubes 84 lead through the end plates 80, and the surrounding wall 46, through an exterior fitting 88, for attachment to lead-in lines 89 carrying the chemicals to the device.

Mounted on the upper end of the shaft 68 above the bearing support 74 is a rotary spreader 90 (Fig. 5), also shown in Fig. 3. This spreader rotates with the shaft and includes a bottom plate 92, of conical shape, and vertical blades 94 opening radially outwardly, following the slope of the bottom plates, i.e., downwardly. The bottom plate and blades have a central opening 96, for receiving the upper bearing 70.

Mounted on the shaft 68, below the bearing support 74, is an applicator 100 (Figs. 9 and 10). This applicator includes a central hub 102, secured to the shaft, and a bottom plate 101, and vertical radial blades 106. This applicator is of lesser depth than the spreader 90.

In the steps of operation, in this phase, it is explained that the grain is introduced through the top opening 50 and it falls on the spreader 90, which throws the grain out against the surrounding wall 46. The liquid chemicals falling from the tubes 84 are thrown outwardly by the applicator 100, also into engagement with the falling grain and the surrounding wall.

The thin mass of grain which was thrown out by the spreader 90, flows down along the wall, and mixes with the chemicals and as it reaches the level of the applicator, the wet mixture then flows into an upper bowl 104 which is fixadly mounted in the drum. This bowl includes a surrounding annular imperforate wall 107, tapering downwardly to a central discharge outlet opening 108, and at its upper end is a cylindrical flange 110, by which it is mounted on the inner surface of the surrounding wall.

Mounted below the upper bowl 104, is an upper coater 112, which is generally similar to the spreader 90, but of different dimensions, being smaller in diameter than the latter. The coater includes a central hub 114, by which it is mounted on the

shaft 68 for rotation therewith. It includes bottom plates 116, and vertical radial blades 118 opening radially outwardly.

This upper coater 112, is positioned close to the upper bowl 104, and as the grain and fluid mixture flows down the bowl, it falls into the upper coater 112, and is again thrown out against the surrounding wall 46. This action produces a mixing effect, which is added to that of the spreader 90, and upper bowl 104.

Below the upper coater 112, is a central bowl 120, identical in construction with the upper bowl 104, and mounted in a similar manner in the drum. This bowl receives the mixture from the wall 46, in the area radially outwardly from the upper coater 112 and the mixture then flows through this central bowl and down through its bottom opening 122.

Below the central bowl 120, is a lower coater 124, which is identical in construction with the upper coater 112, and operable for throwing the mixture that falls into it from the central bowl 120, in outward direction against the surrounding wall. At this point the mixture as it engages the outer wall continues to flow down through the drum.

The lower bearing support 76, identified above, is constructed as a hogback. Figs. 11 and 12 show its detail construction. It includes a main structural member 125, made up of a pair of plates 126, disposed at an angle to each other and

together extending diametrically across the drum. It is disposed with the apex of the angle upwardly. At the ends are curved mounting plates 128, having apertures for detachably mounting on the surrounding wall as shown in Fig. 5. A central plate 130, is mounted across the lower edges of the plates 126, on which the lower bearing means 72 is secured.

The hogback 76, serves to divide the mass of grain descending as shown in Fig. 1, the blades 126, deflecting the grain mixture sideways, which falls into the bottom bowl 54, from which it flows through the central discharge opening 56.

Means is provided for facilitating flow of the mixture through the device. The mixture tends to become sticky due to the inherent stickiness of the chemicals, and also because of the mixture of dust and dirt with the chemicals. This produces what is actually a mud, retarding the flow of the mixture.

This mud accumulates most objectionally in the bowls 104, 120 and 54.

To overcome this problem three pairs of wipers 128, 129, 130 are provided as shown in Fig. 14. In each pair, the wipers are mutually identical, and arranged symmetrically, on a common diameter. The wipers in the different pairs differ in size and shape.

Each wiper 128 includes a small flat steel mounting piece 132 welded to the applicator, on the under surface of the latter

and at the periphery thereof, and a blade 133 extending down into the upper bowl. The blade is positioned at the periphery of the bowl. Its upper edge 135 is inclined upwardly in radial outward direction to a point 136 above the flange 110 of the bowl, engaging the wall of the drum at that point. Its radially outer edge 138 also engages the flange. The lower edge 139 of the blade engages the wall of the bowl down to a point 141, and its lower/inner edge 142 extends up to the mounting piece 132. The blade 133 is made of rubber belting material of known kind, and accordingly is relatively stiff and will yield upon engaging an obstacle.

The blades 133 are spaced apart, engaging the bowl only at the outer portion thereof, and leaving an empty space therebetween.

The wiper blades, in each pair, extend approximately three-fourths of the slant height of the sloped bottom, from the upper edge of the latter, leaving the lower one-fourth open.

The wipers, upon rotation with the shaft, wipe the bowl, and wipe the mixture and work it inwardly so as to position it directly over the bottom outlet opening. This action forms a dense column at the center which as a mass moves downwardly, overcoming the tendency of the accumulation of the mixture on the wall of the bowl.

In the case of the wipers 129, the mounting pieces 142 are secured to the upper coater 112 which is of lesser diameter than the applicator 100, and the blades are therefore radially longer than the blades in the wipers 128. The upper edged 143 is inclined upwardly and terminates at 145 at the upper edge of the flange 110.

The wiper 130 includes a central hub 146 mounted on the lower end of the shaft 68 to which mounting pieces 148 are welded.

The blades 149 engage the inner surface of the bottom bowl 54 at the upper part of the latter. Thus the three bowls are wiped of the mixture, producing faster and more efficient flow.

The hogback 76 leaves a zone 150 (Fig. 12), which is devoid of the grain mixture. A drive motor 151 (Fig. 13) is mounted on an exterior platform 152, and a drive belt 153 therefrom drives the central shaft 68 (see also Fig. 14). This belt extends through the void zone 150, and is thus protected from the falling grain mixture, but however, the grain mixture is enabled to fall freely without interruption over the top of the hogback 76. Diagonal braces 154 (Fig. 13), secured at their upper ends to the drum, provide support for the platform, and thus the drive motor, and this structure and support are part of the self-contained nature of the device.

It is desired that the grain and chemicals be mixed extremely thoroughly in the treater. In the present case, there are no chemicals mixed outside the treater. The chemical and grain mixing provided in the seed treater is extremely intense, and efficient. The spreader 90, it located directly under the top inlet opening 50 and receives all of the grain falling into the unit. The grain then is thrown out against the surrounding wall, as stated, and in this step the grain forms a thin mass on the wall. This mass of grain flows or slides down the wall, and at the next step, at the level of the agitator 100, is injected with chemicals. The purpose of the agitator is to throw the atomized fluid chemicals outwardly. The mixing of the grain continues, and the chemicals also mix with the grain at this stage, and progressing downwardly, the grain mixture with the chemicals flows into the bowl 104. The grain mixture then slides down the inclined surface of the bowl and exits through the central opening 108.

Each coater is of lesser diameter than the bottom opening in the bowl above it, but due to the inclination of each bowl, the mixture is directed inwardly, in falling, into the coater below the bowl.

In all of these actions, the grain is mixed and remixed, and the liquid chemicals are mixed therewith and simultaneously so. It is desired that the liquid chemicals thoroughly coat all

the surfaces of the individual kernels of the grain, and the repeated reversing in direction produces a sliding, turning and rubbing action between the kernels, thus completely distributing the chemicals around the total surfaces of the individual kernels. In addition to vertical falling movement of the kernels of this action, there is a swirling effect due to the rotation in the various members. This swirling action takes place throughout, and any interruption of that swirling action is again reestablished in the repeated action of the coaters.

The swirling effect is shown to continue after the mixture leaves the unit, as shown in Fig. 13.

Fig. 13 also shows the fluid lines (89) leading from a supply of chemicals to the unit, and leading into the outlets 88 (Fig. 5) as referred to above.

The bottom closure plate 54, as shown well in Fig. 14, is tapered similarly to the bowls, 104, 120, confining the grain as it is being discharged, to a relatively narrow stream at the center.

A unit as described above, having a drum in the neighborhood of 40" in length and 24" in diameter, has a capacity for treating grain at the rate of about 1500+ bushels per hour or 45+ tons per hour. Any desired capacity may be accomplished by selectively changing the size of the machine. The drive motor 150 is sized to the unit.

The motor may be of fixed RPM, or of variable speed. One motor drives all the internal moving parts of the device.

End of Descriptive Specification